Constructing a circle through three given points

1. Draw a segment between any two of the points

2. Construct the perpendicular bisector of this segment

3. Draw a segment between two other points

4. Construct the perpendicular bisector of this segment

5. The point of intersection of these two perpendicular bisectors is the center of the circle that is being constructed. Place the tip of the compass at this point of intersection, and open it to any of the three original points.
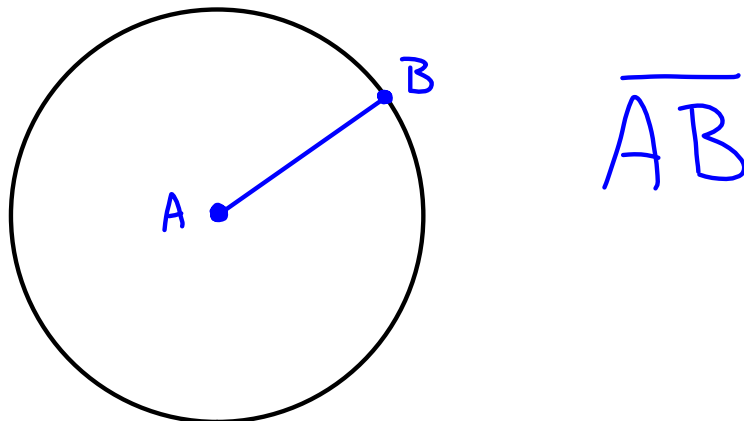
6. Draw a circle passing through all three points

CIRCLE

LOCI
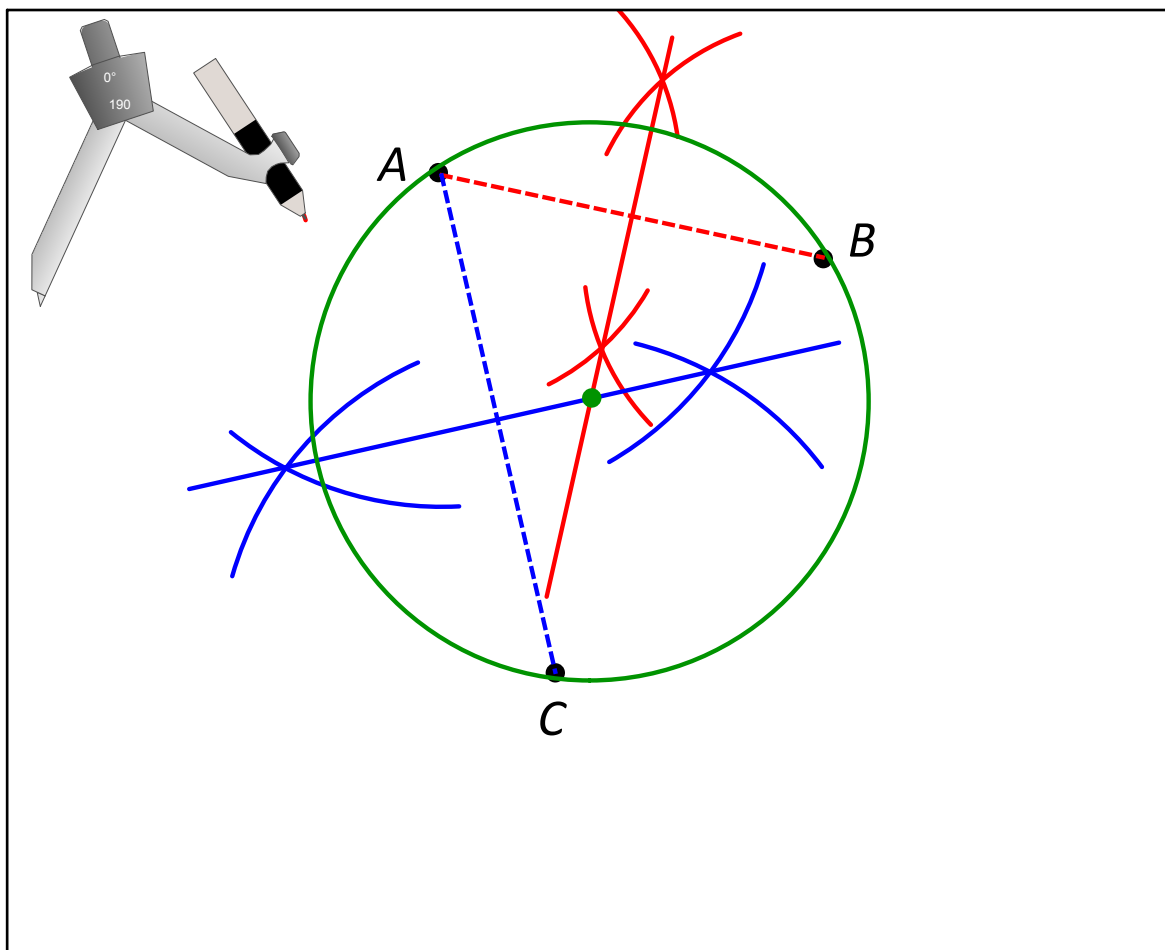
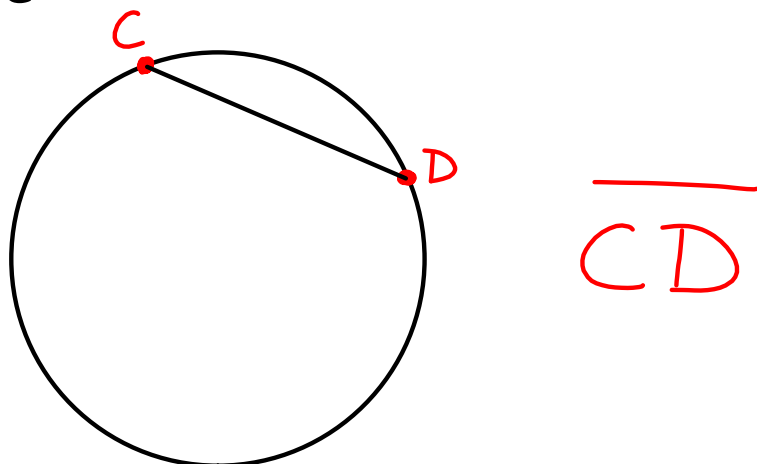The set of all points in a plane that are equidistant from a given point (called the center)
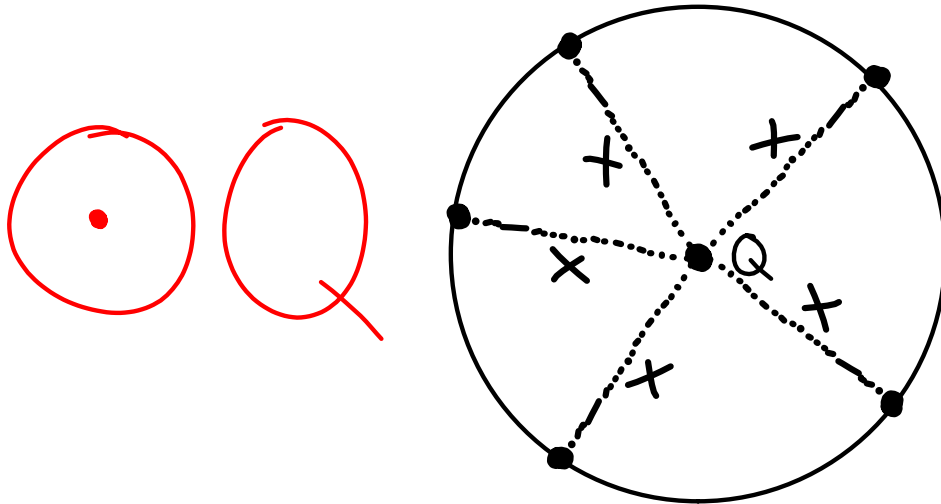
RADIUS

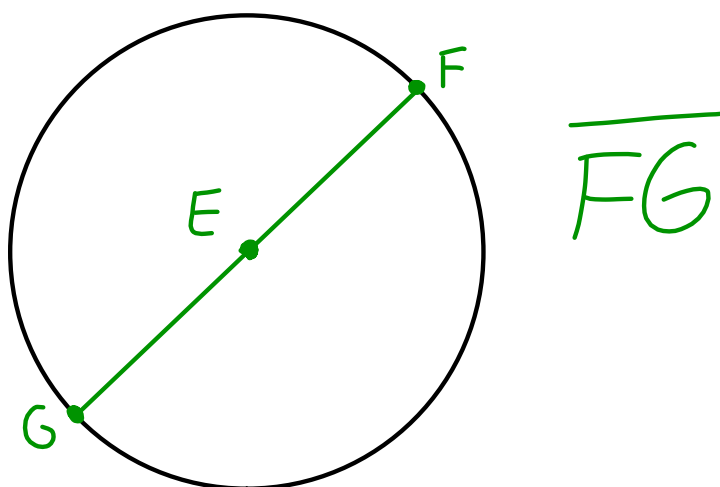A segment whose endpoints are the center of a circle and any point on the circle

$\overline{AB}$
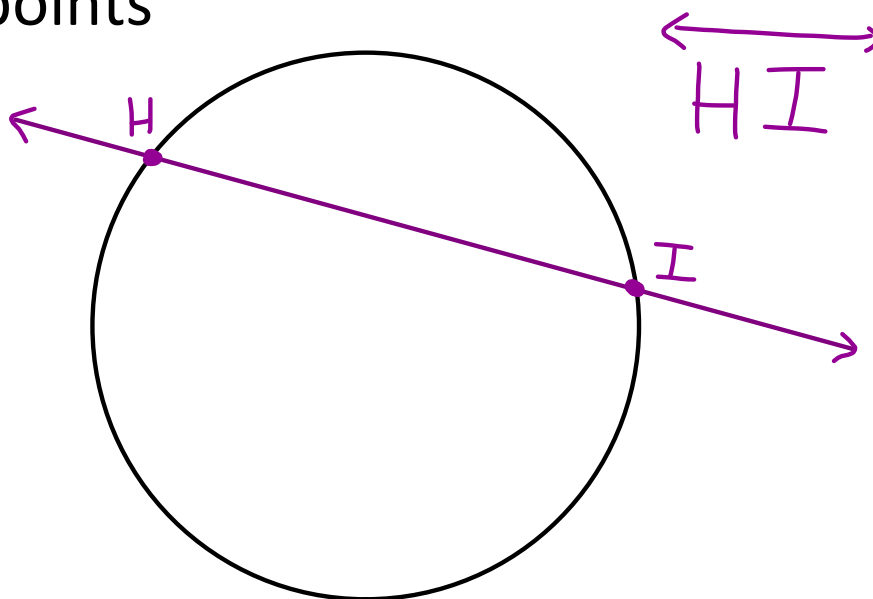
CHORD
A segment whose endpoints are on the circle

$\overline{CD}$

DIAMETER
A chord that passes through the center of a circle
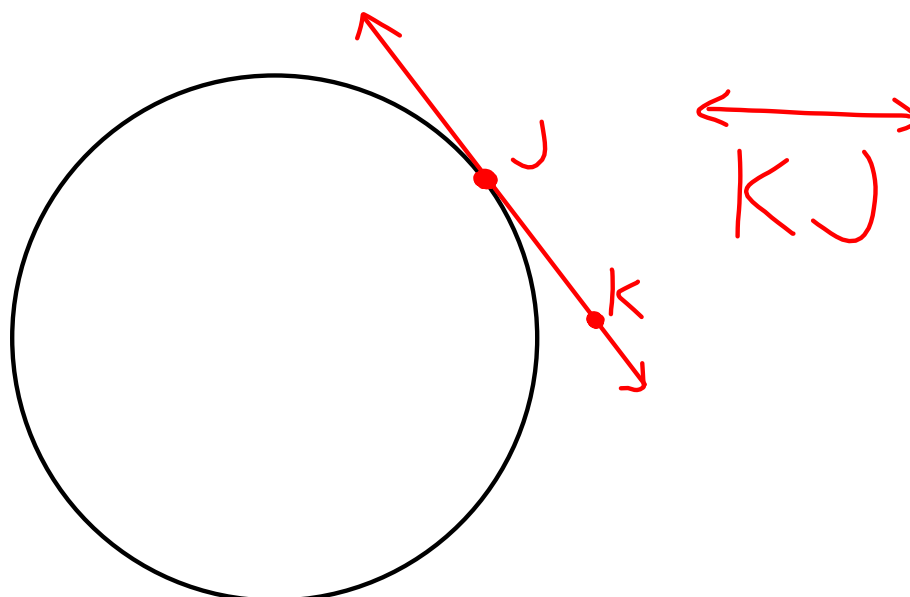
$\overline{FG}$

SECANT

A line that intersects a circle at exactly two points

TANGENT

A line that intersects a circle at exactly one point, called the *point of tangency*
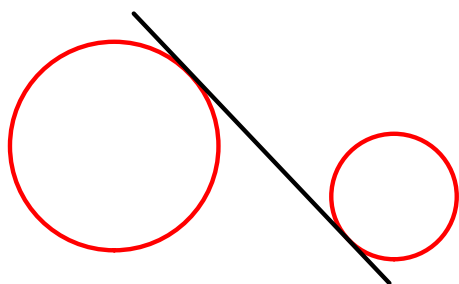
COMMON TANGENT
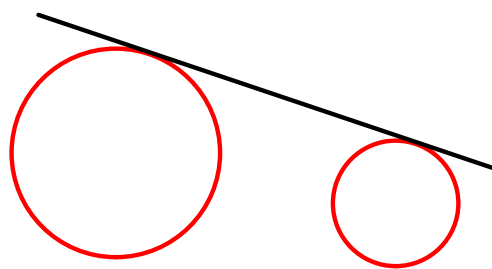## A line that is tangent to two circles
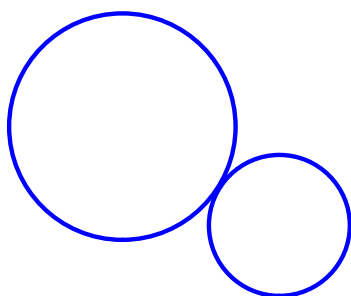
COMMON INTERNAL

* GOES B/T THE 2 CIRCLES

COMMON EXTERNAL
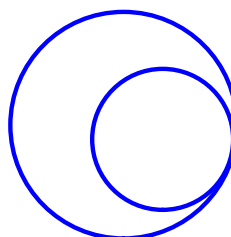
* STAYS OUTSIDE OF THE 2 CIRCLES

TANGENT CIRCLES
Two circles that intersect in exactly one point
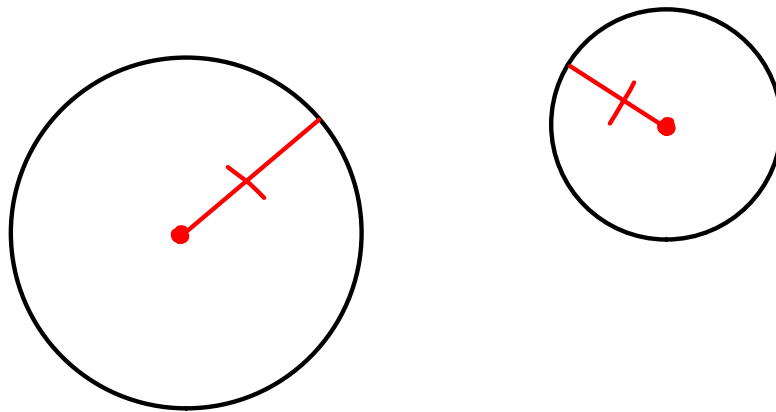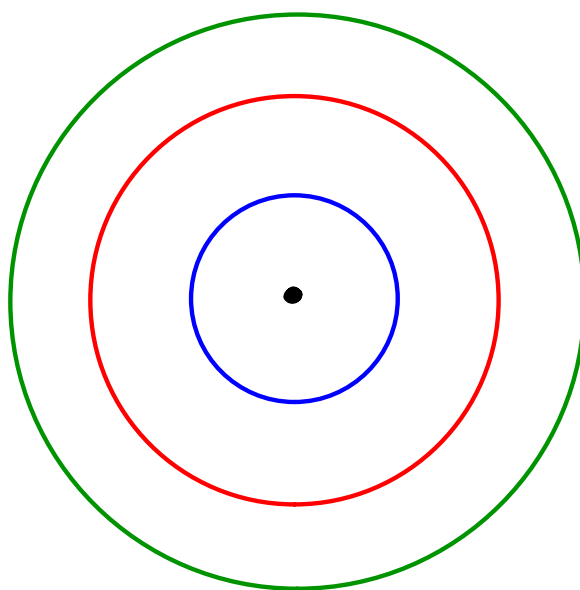
EXTERNALLY TANGENT

INTERNALLY TANGENT

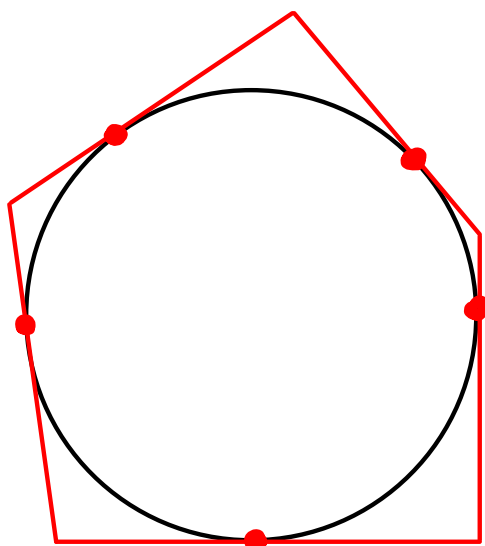# CONGRUENT CIRCLES
Two or more circles with congruent radii

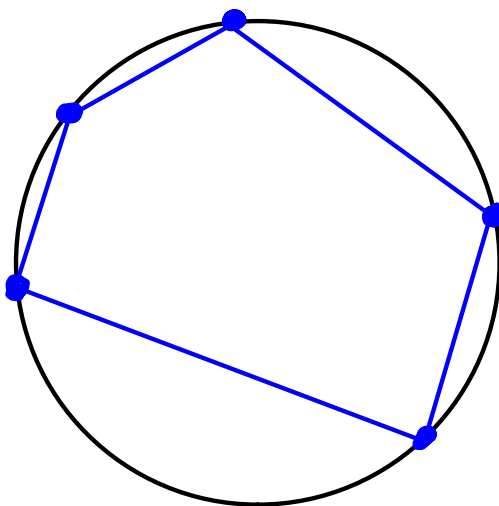# CONCENTRIC CIRCLES
Circles that have the same center

CIRCUMSCRIBED POLYGON
A polygon drawn outside of a circle, where all sides are tangent to the circle

INSCRIBED POLYGON
A polygon drawn inside of a circle, where all vertices lie on the circle

<u>Constructing an equilateral triangle inscribed in a circle</u>

1. Mark a point anywhere on the circle, and label it A
2. Set the width of the compass as the radius of the circle
3. Without adjusting the width of the compass, place the tip at A and draw a circle of equal radius
4. Label the intersection points of the two circles as B and C, and use a straightedge to draw $\overline{BC}$
5. Set the width of the compass to the length of $\overline{BC}$
6. Place the tip of the compass at B, and draw an arc intersecting the original circle. Repeat this process from C.
7. The two arcs should intersect on the circle. Label this point of intersection as D.
8. Using a straightede, draw $\overline{BD}$ and $\overline{CD}$. ΔBCD is equilateral.
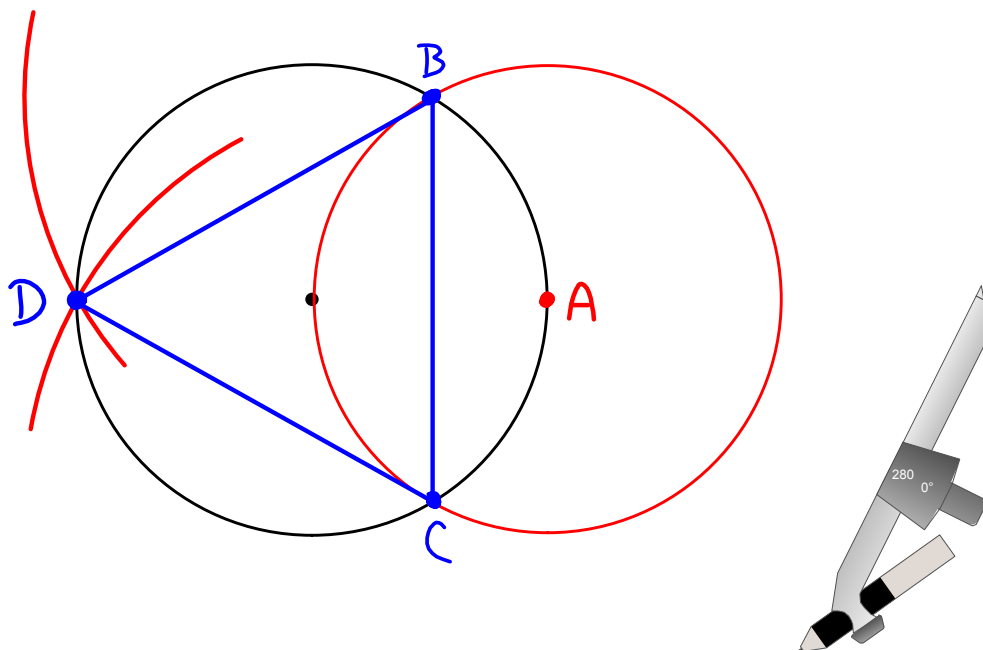
<u>Constructing a square inscribed in a circle</u>

1. Mark a point anywhere on the circle. This will be the first vertex of the square.

2. Using a straightedge, draw a diameter from this vertex. Label its endpoints as *A* and *C*

3. Construct the perpendicular bisector of this diameter. When drawing the segment, make it long enough to intersect the circle, and label the points where it does so as *B* and *D*

4. Using a straightedge, draw segments $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$
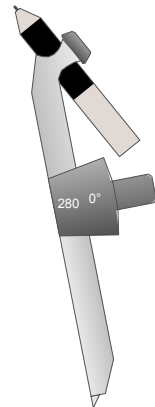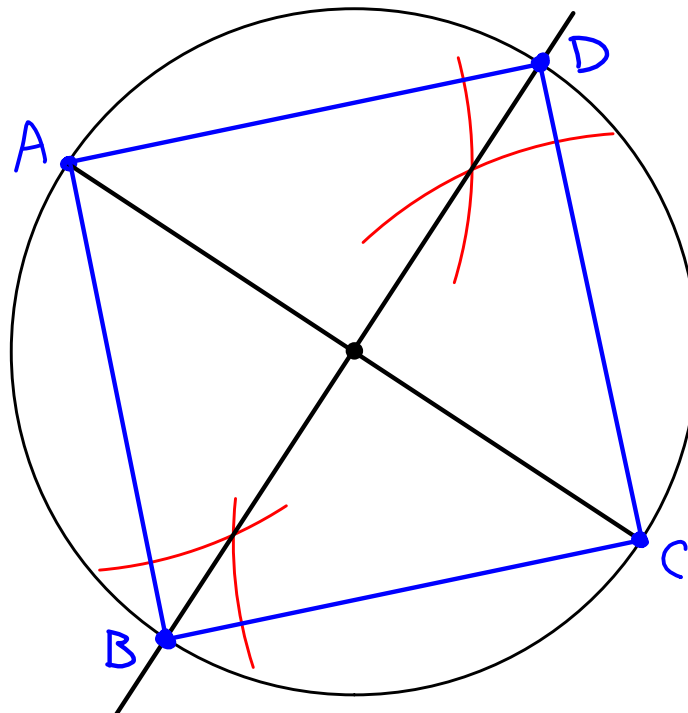
<u>Constructing a regular hexagon inscribed in a circle</u>
** Property of regular hexagons: side is equal to radius

1. Mark a point anywhere on the circle. This will be the first vertex of the hexagon

2. Set the tip of the compass on this vertex, and set its width to be the center of the circle

3. Make an arc across the circle. This will be the next vertex.

4. Set the tip of the compass on this 2nd vertex, and draw another arc across the circle

5. Continue this process until all six vertices are drawn

6. Using a straightedge, draw a segment between each pair of successive vertices